A Framework for Enhancing the Sharing of Teaching Practices among University Instructors

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DOI: 10.34190/EKM.20.219

Abstract: This research paper describes a teaching practices management framework (TPMF) that strongly supports sharing processes among instructors, particularly those that can be performed with the help of an information system. The purpose is to allow teachers' accumulated experience to be identified, shared and reused, which can offer significant benefits, including the introduction of teaching innovations. Such innovation can lead to improvements in overall teaching quality and the enhancement of academics' professional development efforts. The development of the TPMF in the present study has been informed by semi-structured interviews conducted with 22 instructors working in two universities in Saudi Arabia; these interviews were undertaken to better understand the academics' actual knowledge sharing behaviours in relation to TPs and also to gain a perspective of current knowledge sharing approaches. An inductive coding approach was employed to help the researcher extract themes that were mentioned by the interviewees. It is believed that this framework could be of great assistance to the higher education sector. We further recommend that it could be used as a guideline for developing systems aimed at improving TP sharing among academics.

Keywords: knowledge management system, knowledge sharing, higher education institutions, knowledge sharing system, teaching practices

1. Introduction

Knowledge Management (KM) is a major issue for any organisation that aims to facilitate the capturing, sharing and/or application of knowledge (Agarwal et al., 2005). In the last decade, a number of researchers have sought to focus on the possibilities and benefits of implementing KM practices in universities (Sohail and Daud, 2009; Devi Ramachandran et al., 2013). Fullwood et al. (2013) argue that higher education is part of the knowledge business, since higher education institutions (HEIs) engage in significant levels of knowledge production; it is essential, therefore, to manage this knowledge efficiently in order to make further advances.

However, the higher education sector has not yet fully utilised KM's capabilities (Devi Ramachandran et al., 2013); this is largely because its successful implementation depends on a wide range of critical factors within and outside the educational environment (Moghaddam et al., 2013). Without effective knowledge management, prior knowledge cannot be retained and new knowledge cannot be stored/shared (Sohail and Daud, 2009).

In conducting this research, we have focused on teaching practices (TPs) that develop instructor capabilities and improve overall learning in higher education environments. TPs can be defined as representing the knowledge related to delivering curricula that has resulted from the accumulation of academics' experience gained through their years of teaching in universities. TPs could include faculty teaching materials, teaching pedagogy, lessons learned, slides, previous question papers, assignments, solutions to problems, and references to teaching materials. Without sharing TPs, academics are likely to constantly reinvent practices, and this leads to a situation whereby there is no way of leveraging prior experience and existing expertise (Usman et al., 2014).

Hence, our overall research aim is to answer the question of how HEI instructors can more effectively identify, share and reuse their teaching practices. The terms 'academic' or 'instructor', when used in this paper, refer to those teaching in higher education institutions (HEIs). The research starts with an empirical analysis of the problem space, which is captured by our first research question (RQ):
RQ1: What are academics' actual knowledge sharing behaviours in relation to TPs?
Building on the empirical findings made in response to this question, we then developed a framework, hence:
RQ2: What framework is required to build an effective TPs management system for university instructors?

2. Background

Teaching activities result in a remarkable quantity of TPs, which shape academics' expertise. Many authors have highlighted the potential benefits of managing TPs. They mention that managing TPs has the ability to facilitate access to published knowledge sources within the academic community, improve overall teaching quality, enhance academics' professional development efforts and reduce workloads (Fullwood et al., 2013; Samoilenko and Nahar, 2013). Although TPs can offer many benefits, oftentimes, universities fail in the sharing process (Devi Ramachandran et al., 2013). While current communication approaches – such as face-to-face interaction, paper-based documents and emails – allow instructors to share TPs, many universities still face difficulties when attempting to improve the sharing of knowledge accumulated by instructors due to geographical and social constraints. At the same time, these above-mentioned approaches are highly resource-intensive and time-consuming, requiring instructors to consume a great deal of time and effort in capturing, retrieving, and reusing TPs. In the e-learning field, most efforts have focused on the transmission of course content to learners, with very little attention being given to transmitting instructors' expertise to other instructors. Additionally, the available technologies often fail to support the sharing process because they are limited to the solving of technical issues only and do not take into consideration the end-user requirements. From a study of the relevant literature, it can be also seen that despite the growing number of knowledge management systems developed for various contexts and purposes, few of these systems have successfully achieved their objectives.

It can be concluded that far too little attention has been paid to the enhancement of knowledge sharing processes in the higher education sector (Moghaddam et al., 2013). Due to the absence of effective approaches for managing TP sharing among academics who teach the same (or indeed different) subjects, there is a noteworthy duplication of effort in the educational sector and a consequent replication of materials across a great deal of written course-focused knowledge (Usman et al., 2014). Additionally, insufficient knowledge sharing can critically hinder the successful implementation of teaching expertise, and this can affect instructors' teaching performance and may result in lower levels of learner success than could otherwise have been achieved.

To resolve the above problems; to overcome the issues of cost, time and effort involved in obtaining TPs; and to enable people to share TPs, it is essential to develop an appropriate environment, which saves instructors' time and effort when they try to acquire the teaching-related knowledge and experience accumulated by other instructors. For this reason, it is important to develop a new approach – one that allows instructors to capture, transfer, share and apply knowledge effectively.

3. Rationale for the Teaching Practices Management Framework (TPMF)

Before proceeding to develop a framework to support the sharing of TPs among academics in HEIs, it is essential to establish the need for such a framework. Knowledge management of educational expertise is of great importance for capitalising on recent teaching innovations and resources. To effectively manage knowledge resources, it is necessary to have a framework that classifies the different activities needed to deal with all the knowledge-related issues within an organisation. A knowledge management framework is defined by the European Committee for Standardization (CEN) as "the most essential components of KM and their relationship with each other" (Mekhilef et al., 2003).

Numerous knowledge management frameworks have been developed by researchers over the last two decades. Many of these frameworks focus on the types of KM procedures involved, disregarding the way these procedures are accomplished. The most commonly-used frameworks are the Wiig (1993) framework; the Meyer and Zack (1996) framework; the Dalkir (2017) framework; and, more recently, the Evans et al. (2014) framework, as outlined in Table 1.

Although each of these previously proposed frameworks introduced useful, novel elements into the knowledge management process, the availability of so many frameworks can be a source of confusion when undertaking research (Shongwe, 2016) because different processes are used in each framework. For instance, there are three stages in the Wiig (1993) framework but six processes in Evans et al. (2014). Furthermore, the terminology used in these frameworks can also present a source of confusion, especially when the same things are designated differently. It has also been noted that in some frameworks, the processes follow a certain sequence (Evans et al., 2014), while in others, they do not follow any sequence (Meyer and Zack, 1996); this represents another

source of disorientation. Consequently, there is a need to develop a new and unified framework that is generally accepted for HEIs in order to help reduce the above-mentioned confusion.

Table 1: KM lifecycle frameworks

Source	KM lifecycle
Wiig (1993)	Creation, manifestation, usage and transfer
Meyer and Zack (1996)	Acquisition, refinement, storage/retrieval, storage/retrieval distribution and presentation
Evans et al. (2014)	Identification/creation, storage, sharing, usage, learning and improvement
Dalkir (2017)	Knowledge capture and/or creation, knowledge acquisition and application, and knowledge sharing and dissemination

4. Methodology

We conducted a qualitative study with participant instructors who worked in one of two universities in Saudi Arabia with the aim of better understanding academics' knowledge sharing behaviour in relation to TPs and gaining a systemic and overall perspective of the current knowledge sharing approaches. According to Myers and Newman (2007), semi-structured interviews provide the opportunity to explore a topic in depth. Therefore, face-to-face interviews were conducted with 22 academics. Conducting the study across many different educational institutions would be prohibitively costly and time-consuming, and it was felt that selecting only two universities – the University of Princess Nourah and the King Saud University – would assist in minimising the time and financial resources used, especially since the first author had access to information relating to study practices for both universities, such as details regarding course materials, the e-learning system, the academic staff, the university structure and the universities' departments.

Each interview session took approximately 60 minutes and was audio-recorded and then manually transcribed. To help ensure their validity, the interview transcripts were sent to the interviewees for review and feedback. Some interviewees responded with minor alterations, which were then incorporated into the transcripts before the coding process was started. MaxQDA2018 was used to analyse the transcripts via an eclectic coding procedure (Saldaña, 2015). An inductive coding approach was employed to help the researcher extract themes that emerged from interviewees' responses.

5. Results

The majority of respondents (n = 21) agreed that capturing and retrieving teaching practices is important but often difficult to perform: *"It is really difficult to access experts who are located on a different campus. There is a need to go through a long process to obtain the knowledge you want"* (P03). Another participant reported similar thoughts: *"I sometimes use Google to find what I want instead of interrupting other academics during work hours"* (P12).

The findings also revealed that the academic departments involved do not currently have a standardised method for sharing teaching practices. The current approaches for this employed in other universities are neither useful nor usable, from the academics' perspectives, as described in the following quotes: *"Mostly, in the computer science department, this is done in informal ways over coffee or during lunchtime. I don't think there are any specific forms that are used to exchange teaching knowledge within the department itself. I believe it is important that instructors talk about their teaching practices"* (P11).

> *"There is a lack of details about when, where and how to apply a teaching practice because the exchange of knowledge often occurs on the go"* (P08).
>
> *"… At the end of each term, academics have to fill in forms for the Quality Assurance Department. The forms include submitting course syllabi and recording the teaching methods used during the term. The forms are complex and designed to not fit with academics need"* (P10).
>
> *"I am not sure if the knowledge shared is credible, if it has been applied before or if it proves its usefulness to achieve a certain outcome"* (P15).
>
> *"I do not share because I do not receive anything in return for sharing with others"* (P20).

As a result, it is apparent that the majority of the respondents face significant challenges relating to identifying and employing the best means to capture, retrieve, evaluate and reuse knowledge to create value and enhance teaching quality.

Therefore, we have developed a comprehensive Teaching Practice Management Framework (TPMF), which (among other things) illustrates a new approach for facilitating the sharing of teaching practices. The TPMF is grounded on the definition of the Socialisation, Externalisation, Combination and Internalisation (SECI) knowledge conversion process (Nonaka, 2008), and results from the qualitative study with real end-users (academics). The SECI model would seem to be the best candidate since this knowledge creation/conversion model emphasises collaborative learning (Nonaka and Takeuchi, 1995). Figure 1 illustrates the structure of the proposed framework.

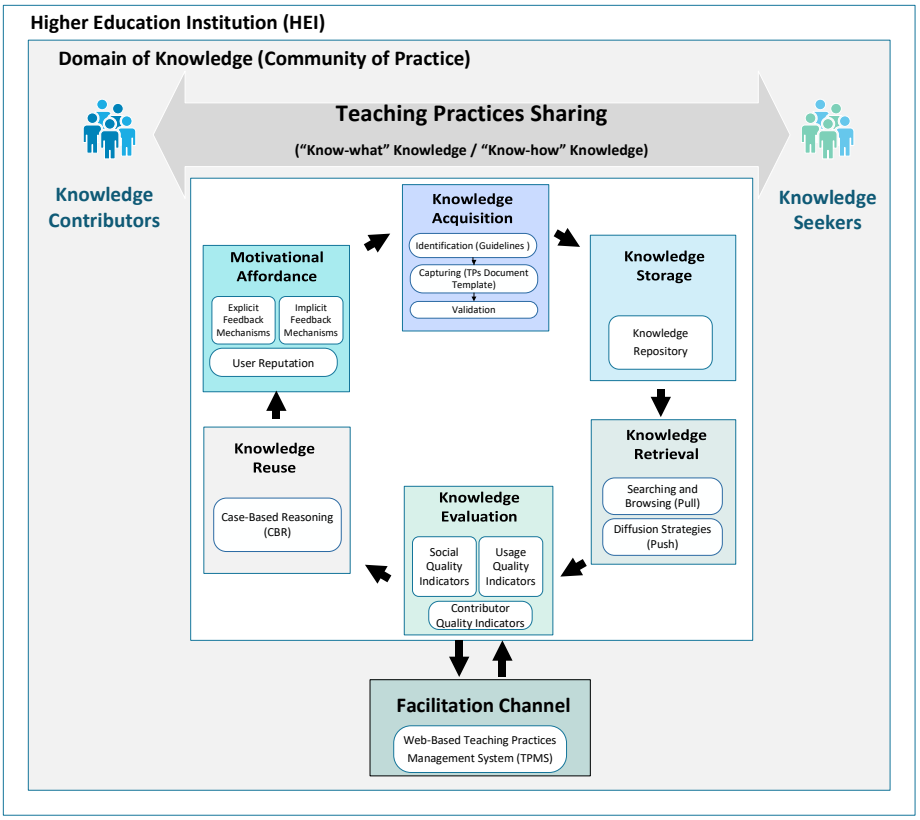

Figure 1: The Teaching Practices Management Framework (TPMF)

The outer rectangle signifies that the framework is seated in academia. By academia, we mean HEIs such as universities and colleges. The socialisation process of the SECI model is represented by the inner rectangle, titled 'Community of Practice' – which points to special groups of users working as communities and sharing expertise related to specific topics of interest. The existence of a community of practice has been established as the central element of the strategy for promoting the sharing of teaching practices between knowledge seekers and knowledge contributors, where here, both of these groups comprise instructors teaching specific disciplines. Instructors are the potential users of the knowledge sharing processes; any of them may provide, seek, use and/or share knowledge. Knowledge objects can be classified as either 'know-what' or 'know-how'. 'Know-what' knowledge includes the content knowledge to be learned and mastered. In contrast, 'know-how' knowledge consists of the methods and strategies for delivering knowledge to learners, including pedagogical methods, best practices and the uses of technology.

Knowledge sharing is an exchange behaviour that involves both knowledge contribution and knowledge seeking (Hwang et al., 2018). The success of a KM depends on people contributing content to populate it and also on people seeking the knowledge contained therein (Chen et al., 2019). Therefore, the proposed framework classifies the roles of knowledge sharing users into knowledge seekers and knowledge contributors. Together, these groups create a feedback loop (Kankanhalli et al., 2005). The proposed framework promotes interaction between knowledge seekers and knowledge contributors to create an optimal two-way learning process, in

which academics can help others learn while at the same time assisting themselves by learning from others. This interaction is represented as a double-headed arrow.

Several of the more prevalent processes and terminologies from prior frameworks have been combined into broad themes and incorporated in the construction of our practical, easy to use and comprehensive TPMF. We have identified that in higher education, and for each community of practice, five basic processes are necessary for the effective sharing of teaching expertise. These components are knowledge acquisition, knowledge storage, knowledge retrieval, knowledge reuse and knowledge evaluation. These processes are supported by motivational affordances that allow for the motivation of instructors so that they voluntarily share their teaching expertise and interact with their peers.

It is important to note that none of these processes are independent, as we will explain in the following subsections. Additionally, the knowledge sharing processes do not follow a specific sequence; therefore, in our framework, they are implemented within a life cycle in an attempt to stimulate what actually occurs inside a higher education institution.

The inflows and outflows of knowledge among instructors who supply (contribute) and demand (seek) knowledge are indicated by the two arrows, as shown in Figure 1. The flow of knowledge is mediated by a facilitation channel, which enables knowledge transfer sharing processes. Potential members must use the communication channel to join the community of practice and to facilitate knowledge sharing.

In the following subsections, we will discuss each of the six inner components in detail.

5.1 Knowledge Acquisition

When the participants were asked how they recorded and shared their TPs, all of them (n=22) admitted that documenting teaching experience in a way that made it reusable, for other subjects or even for the same subject, seldom takes place. There are several reasons for this, the main one being the absence of a proper method for capturing complex and context-specific TPs. The majority of respondents (n=17) showed dissatisfaction with the current documentation approaches implemented by their respective quality assurance departments for recording teaching experiences – a process that occurs at the end of the academic year. They stated that the documents employed had various formats and text-based structures, and that they are therefore difficult to create and complete. Also owing to this complexity, much effort is needed to find, understand and reuse key information from the resulting documented teaching practices. Therefore, the interviewed academics reported the need for an easier-to-use tool for documenting their teaching practices.

The externalisation process of the SECI model is triggered when instructors acquire knowledge sources created in the socialisation process and wish to make them available to the community. Thus, in this context, to enable inter-departmental, intra-departmental and organisational learning, documenting teaching experience knowledge is an unavoidable necessity (Alavi and Leidner, 2001). Documented teaching experiences should be structured by expressing, coding and preparing knowledge for sharing and storage in ways that make it easy to read, understand, find and reuse (Wu, 2009). Thus, a knowledge acquisition process is proposed in the framework, which enables instructors to identify and input their teaching expertise to the knowledge repository. Dalkir (2017) defines knowledge acquisition as the stage at which knowledge is contextualised in such that it can be understood.

Knowledge acquisition is achieved by means of a three-step procedure: identification, capturing and validation.

5.1.1 Identification

To help instructors to recognise the TPs that will add value to the learning process and that can be reused by others, a set of guidelines is required to enable users to judge whether a proposed TP is worth sharing.

5.1.2 Capturing

To overcome issues that the current knowledge capture approaches exhibit, the framework proposed here employs a Teaching Practice Document Template (TPDT), the structure of which was designed based on the instructors' expressed requirements in relation to describing TPs in a detailed and systematic way. The template aims to assist instructors in describing various TPs by controlling the type of information requested and providing a suitable approach to the capture of the user's expertise. Its structure is that of a set of pre-specified attribute

fields, which act as guidance for the creation of a TP documentation. These attributes all represent items of information relating to the documented TP, its benefits in terms of teaching, where it has been applied and how it has been used in teaching a specific subject.

The TPDT attributes can help the user to record high-quality knowledge; this is important, since poor-quality documentation can result in misunderstandings and consequently poor reuse of TP. "Without rich and valuable knowledge, online communities are of limited value" (Chang et al., 2013).

5.1.3 Validation

in the qualitative study, some academics (n=12) reported that when asked to complete complex or comprehensive forms, they tend to avoid filling out some sections of the form, which, nevertheless, may be valuable. In this context, this behaviour might result in incomplete versions of the knowledge objects being recorded and stored, making it difficult to reuse effectively by others. Therefore, a validation phase concludes the knowledge acquisition process. At this step, the consistency and completeness of the TP will be verified in order to ensure that TP is usable by others.

5.2 Knowledge Storage

Several instructors noted in the interviews that the challenge lay not only in the capturing and recording of knowledge but also the fact that the existing recorded knowledge was often badly organised and generally almost inaccessible due to the absence of a central repository. They also revealed that they stored knowledge resources according to their own needs and preferences in local storage facilities, such as PCs, drives and shared folders.

The combination process of the SECI model is supported, here, by knowledge storage that aims to facilitate knowledge sharing among academics. Knowledge storage refers to the coding and indexing of knowledge saved in the organisation's storage facilities for future retrieval (Dalkir, 2017). Knowledge storage is important in HEIs because an instructor's knowledge acquired from many years of experience in the teaching profession may well be entirely lost if it is not recorded in sufficient detail, and especially if it remains implicit and held only by that instructor; this often occurs in the natural course of academic retirement. If there is no provision for recording TPs, then, when an instructor leaves the organisation or retires, their knowledge will leave with them, and hence, according to Natali and Falbo (2002), it is necessary to create provisions that prevent the loss of institutional knowledge and enhance knowledge accessibility through a centralised, well-structured resource. The value of institutional knowledge increases when it is made readily available in storage repositories for present and future use (Jasimuddin et al., 2006).

In the framework proposed here, once a knowledge object has been deemed complete, it is stored as an active component of the organisation's memory in an accessible knowledge base – *i.e.* 'the Knowledge Repository' – for future reuse. This ensures that knowledge relevant to a given organisational activity can be made available quickly, efficiently and from a centralised location (Samoilenko and Nahar, 2013). The fact that knowledge is stored in a structured way enables knowledge seekers (instructors in this case) to retrieve the teaching practices they require efficiently, as described in the next section.

5.3 Knowledge Retrieval

When seeking knowledge by employing a face-to-face approach, several instructors (n=15) noted that they had to expend considerable time and effort to find out the knowledge that they required from the person who possessed it; this was due mainly to geographical and social constraints.

The internalisation process of the SECI model is here facilitated by the retrieval of knowledge resources. Therefore, a knowledge retrieval process is proposed in this framework as an essential component for addressing the issue of academics who otherwise have to search for specific kinds of knowledge across a large number of resources, thereby expending a great deal of time and effort. Powerful search and related capabilities, allowing access to content and to the people who have provided it, can be achieved through the implementation of direct access mechanisms; these can be classified into those which use 'push' and those which use 'pull' approaches. A push approach consists of, for instance, disseminating newly added content to potentially interested users. In contrast, a pull approach consists of, for example, enabling knowledge seekers to search for the knowledge they require using a query-based approach. It should be noted that the retrieval facilities of the TPMF can be seen as a bridge between the upstream 'acquisition and storage' process and the downstream

'reuse and evaluation' through which knowledge is put into practice; the latter is described in the following sections.

5.4 Knowledge Reuse

Once knowledge relating to one or more academic activities has been retrieved, the teaching practices it includes can be activated – *i.e.* their value can be extracted, and they can be applied in teaching activities – to solve problems, make decisions or improve work efficiency (Sekkal et al., 2019). Markus et al. (2002) emphasised the importance of applying knowledge in organisational processes and stated that the key to the success of knowledge sharing is the reuse and application of the stored knowledge. Therefore, knowledge reuse is a valuable element of a TPMF. As Choi et al. (2010) conclude in their work, "no matter how much knowledge is shared among team members, it cannot enhance team performance unless it is effectively applied".

The main objective of knowledge reuse is to allow the knowledge consumer to apply TPs. As TPs are context-based, they need to be adapted to any new context in which they will be applied. Therefore, to support the reuse of teaching practices, the framework encourages instructors to specify (at the time of knowledge acquisition) where and how the TP can be reused in other contexts and what learning outcomes may be expected from applying the TP. This information is then available to be searched for by knowledge seekers.

An important aspect of the knowledge reuse phase is that it provides motivation for the evaluation of the stored knowledge (the next phase, detailed below) and the creation and capturing of more knowledge. When a retrieved TP is applied in a new context, it is refined and enhanced, and consequently, an additional, though related, TP may be created. As a result, the knowledge repository is enriched, and the cycle repeats.

5.5 Knowledge Evaluation

The interview study revealed that the several instructors (n=14) found it difficult to assess the quality of knowledge acquired from face-to-face interaction or from the then available quality assurance documents, and consequently, they rarely reused others' knowledge. They also mentioned the difficulties they experienced when attempting to evaluate the large numbers of results/links obtained from searching via Web 2.0 technologies and in particular when choosing from these the appropriate knowledge objects that meet their requirements. Therefore, an important aspect of KM, as used in the teaching and learning process, is knowledge evaluation; this is adopted in the framework here to assess the usefulness and applicability of the knowledge acquired and ensure that the knowledge, as compiled and stored, is continuously maintained and, indeed, evaluated.

The evaluation stage of TP sharing is based on three major dimensions: social, usage and contributor.

5.5.1 Social Quality Indicators

Social quality indicators are metrics that track the user's explicit feedback. Explicit feedback mechanisms are the best way of capturing judgments about knowledge objects because they reflect the users' own evaluations, which are expressed by the users explicitly summarising their opinions about the usefulness of posted teaching practices (Jawaheer et al., 2014).

5.5.2 Usage Quality Indicators

Usage indicators are metrics that track the users' implicit feedback via their behaviours. Implicit feedback is information that can be automatically inferred from user behaviour, measuring users' levels of interest and satisfaction regarding posted knowledge objects (Claypool et al., 2001). Implicit feedback commonly uses data, such as document reading times, numbers and types of interactions and scrolling, as evidence of user interest in a particular knowledge object.

5.5.3 Contributor Quality Indicators

Previous studies have revealed that user reputation is a good indicator of the reliability and quality of content (El-Korany, 2013). Reputation is defined by Abdul-Rahman and Hailes (2000) as "an expectation about an agent's behaviour based on information about or observation of its past behaviour". Contributors with high reputation scores are likely to provide the knowledge repository with high-quality knowledge objects (Xu and Jin, 2013).

5.6 Motivational Affordance

As described in the results of the interview study, the main challenge is to persuade instructors to voluntarily share their teaching expertise and to interact with their peers in relation to such. This is primarily because an instructor's daily routine is typically a very busy one due to their involvement in both teaching and administrative responsibilities; these naturally take priority over participating in knowledge sharing activities. Therefore, a motivational affordance has been proposed for the framework, which has the purpose of motivating instructors to articulate their expertise in teaching and, therefore, to share with their peers. According to expectancy theory (Vroom, 1964), academics may be more willing to take part in knowledge sharing activities by contributing their knowledge when they are offered appropriate incentives as a form of motivation.

The findings from the interviews revealed that knowledge contributors placed more weight on the social recognition they gained after sharing their knowledge than on any possible economic consequences, such as monetary or other tangible rewards. Being recognised by peers keeps instructors' spirits high, positively impacting their self-esteem, self-efficacy and sense of self-worth in terms of their ability to provide knowledge that is useful in solving teaching-related problems. Thus, the motivational affordances adopted in the TPMF consist of the evaluation of explicit feedback, implicit feedback, and user reputation, together; this is a powerful and useful mechanism based on users communicating their interest in particular knowledge objects.

5.7 Facilitation Channel

Supporting the above-mentioned knowledge sharing processes is part of an enabling technology we have termed the 'Facilitation Channel'. The proposed framework assumes the use of a web-based TPMS that facilitates the flow of knowledge and the establishment of connections between academic members – in order to support knowledge acquisition, storage, retrieval, evaluation, motivation and reuse.

6. Conclusion and Next Steps

In this research, a solution was sought to the problem of ineffective knowledge sharing among higher education academics. We found that current knowledge sharing approaches are neither adequate nor effective. We reviewed various knowledge management frameworks and found that none of the existing, relevant frameworks meet the needs of higher education academics; therefore, they do not provide solutions that fit instructors' needs, specifically. Hence, a new and practical (for this context) framework is proposed in this research. We used a qualitative method to acquire an understanding of current knowledge sharing practices focused on TPs and then, building on the SECI model processes, we systematically constructed our proposal for a TPMF which overcomes the limitations discovered in the current knowledge sharing approaches.

The resultant framework provides a collaborative environment that promotes cooperation in knowledge construction and content sharing, resulting in direct benefits for both contributors and seekers. It includes facilities whereby instructors can capture, share, retrieve, and reuse TPs. The proposed framework takes a holistic view of the knowledge sharing life cycle. It builds on previous frameworks but includes some novel knowledge sharing processes. The reuse and evaluation phases tie in the value creation aspect of the knowledge life cycle more closely and provide more flexibility, allowing for feedback and the reuse of differing knowledge resources – all leading to a cycle supporting the continuous sharing of knowledge. Therefore, in terms of actual practice, the proposed framework may well be of great assistance to higher education sector institutions. Indeed, it is believed that this framework will become a guideline for developing systems aimed at improving TP sharing among academics. It is also likely that it will help system developers to avoid errors and excessive costs in terms of time, effort and money. This TPMF may also be used to validate features of existing knowledge sharing tools in terms of the level of features that such tools provide to support the sharing process.

Although we believe we have indeed derived helpful insights, we also acknowledge that this study suffers from the following limitations (which means, of course, that these represent opportunities for future research). The sample used in the investigative study was relatively small (n = 22).

We now intend to design a new system based on our framework. Then, we plan to perform several implementation iterations, between each of which we will evaluate the system to assess the users' experiences with it, employing a mixed-methods approach, an analysis of the user-interaction log files, and interview sessions.

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